

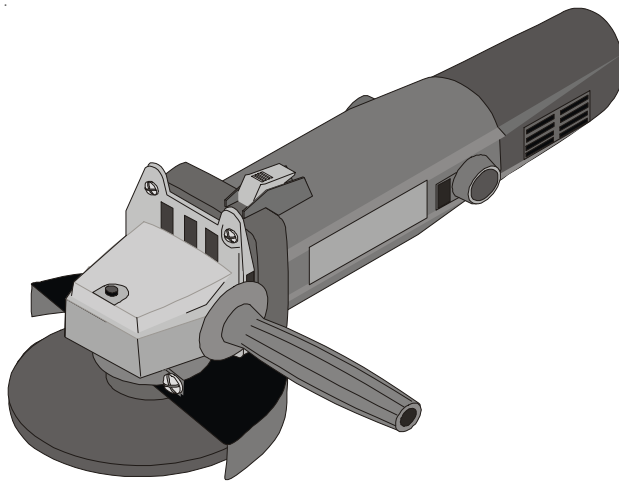
CHICAGO

Electric Power Tools

4-1/2" ANGLE GRINDER

Model 91223

ASSEMBLY & OPERATING INSTRUCTIONS



3491 Mission Oaks Blvd., Camarillo, CA 93011
Visit our Web site at <http://www.harborfreight.com>

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For technical questions and replacement parts, please call 1-800-444-3353

THANK YOU for choosing a **HARBOR FREIGHT TOOLS** product. For future reference, please complete the owner's record below:

Model _____ **Serial No.** _____ **Purchase Date** _____

SAVE THE RECEIPT, WARRANTY AND THESE INSTRUCTIONS. It is important that you read the entire manual to become familiar with the unit BEFORE you begin assembly.

Technical Specifications

Tool Name:	4-1/2" Angle Grinder
SKU:	91223
Motor:	120V/60Hz, Single Phase, 11,100 RPM
Cord Length:	8 FT. 2 Prong UL Approved
Spindle:	5/8" X 11 TPI with 7/8" Arbor
Grinding Wheel:	4-1/2" X 1/4" X 7/8"



GENERAL SAFETY RULES



WARNING!

READ AND UNDERSTAND ALL INSTRUCTIONS
Failure to follow all instructions listed below may result in
electric shock, fire, and/or serious injury.
SAVE THESE INSTRUCTIONS

WORK AREA

1. **Keep your work area clean and well lit.** Cluttered benches and dark areas invite accidents.
2. **Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases, or dust.** Power tools create sparks which may ignite the dust or fumes.
3. **Keep bystanders, children, and visitors away while operating a power tool.** Distractions can cause you to lose control. Protect others in the work area from debris such as chips and sparks. Provide barriers or shields as needed.

ELECTRICAL SAFETY

4. **Grounded tools must be plugged into an outlet properly installed and grounded in accordance with all codes and ordinances. Never remove the grounding prong or modify the plug in any way. Do not use any adapter plugs. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded.** If the tools should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user.
5. **Double insulated tools are equipped with a polarized plug (one blade is wider than the other). This plug will fit in a polarized outlet only one way. If the plug does not fit fully in the outlet, reverse the plug. If it still does not fit, contact a qualified electrician to install a polarized outlet. Do not change the plug in any way.** Double insulation eliminates the need for the three wire grounded power cord and grounded power supply system.

6. **Avoid body contact with grounded surfaces such as pipes, radiators, ranges, and refrigerators.** There is an increased risk of electric shock if your body is grounded.
7. **Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
8. **Do not abuse the Power Cord. Never use the Power Cord to carry the tools or pull the Plug from an outlet. Keep the Power Cord away from heat, oil, sharp edges, or moving parts. Replace damaged Power Cords immediately.** Damaged Power Cords increase the risk of electric shock.
9. **When operating a power tool outside, use an outdoor extension cord marked “W-A” or “W”.** These extension cords are rated for outdoor use, and reduce the risk of electric shock.

PERSONAL SAFETY

10. **Stay alert. Watch what you are doing, and use common sense when operating a power tool. Do not use a power tool while tired or under the influence of drugs, alcohol, or medication.** A moment of inattention while operating power tools may result in serious personal injury.
11. **Dress properly. Do not wear loose clothing or jewelry. Contain long hair. Keep your hair, clothing, and gloves away from moving parts.** Loose clothes, jewelry, or long hair can be caught in moving parts.
12. **Avoid accidental starting. Be sure the Power Switch is off before plugging in.** Carrying power tools with your finger on the Power Switch, or plugging in power tools with the Power Switch on, invites accidents.
13. **Remove adjusting keys or wrenches before turning the power tool on.** A wrench or a key that is left attached to a rotating part of the power tool may result in personal injury.
14. **Do not overreach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the power tool in unexpected situations.
15. **Use safety equipment. Always wear eye protection.** Dust mask, nonskid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.

TOOL USE AND CARE

16. **Use clamps (not included) or other practical ways to secure and support the workpiece to a stable platform.** Holding the work by hand or against your body is unstable and may lead to loss of control.
17. **Do not force the tool. Use the correct tool for your application.** The correct tool will do the job better and safer at the rate for which it is designed.
18. **Do not use the power tool if the Power Switch does not turn it on or off.** Any tool that cannot be controlled with the Power Switch is dangerous and must be replaced.
19. **Disconnect the Power Cord Plug from the power source before making any adjustments, changing accessories, or storing the tool.** Such preventive safety measures reduce the risk of starting the tool accidentally.




20. **Store idle tools out of reach of children and other untrained persons.** Tools are dangerous in the hands of untrained users.
21. **Maintain tools with care. Keep cutting tools sharp and clean.** Properly maintained tools with a sharp cutting edge are less likely to bind and are easier to control. Do not use a damaged tool. Tag damaged tools “Do not use” until repaired.
22. **Check for misalignment or binding of moving parts, breakage of parts, and any other condition that may affect the tool’s operation. If damaged, have the tool serviced before using.** Many accidents are caused by poorly maintained tools.
23. **Use only accessories that are recommended by the manufacturer for your model.** Accessories that may be suitable for one tool may become hazardous when used on another tool.

SERVICE

24. **Tool service must be performed only by qualified repair personnel.** Service or maintenance performed by unqualified personnel could result in a risk of injury.
25. **When servicing a tool, use only identical replacement parts. Follow instructions in the “Maintenance” section of this manual.** Use of unauthorized parts or failure to follow maintenance instructions may create a risk of electric shock or injury.

SPECIFIC SAFETY RULES

1. **Always use proper guard with grinding wheel.** A guard protects the operator from broken wheel fragments.
2. **Accessories must be rated for at least the speed recommended on the tool warning label.**
3. **Hold tool by insulated gripping surfaces when performing an operation where the cutting tool may contact hidden wiring or its own cord. Contact with a “live” wire will make exposed metal parts of the tool “live” and shock the operator.**
4. **Maintain labels and nameplates on the Grinder.** These carry important information. If unreadable or missing, contact Harbor Freight Tools for a replacement.
5. **Always wear safety impact eye goggles and heavy work gloves when using this tool.** Using personal safety devices reduce the risk for injury. Safety impact eye goggles and heavy work gloves are available from Harbor Freight Tools.
6. **Maintain a safe working environment.** Keep the work area well lit. Make sure there is adequate surrounding workspace. Always keep the work area free of obstructions, grease, oil, trash, and other debris. Do not use a power tool in areas near flammable chemicals, dusts, and vapors. Do not use this product in a damp or wet location.
7. **WARNING! All accessories for this tool must be rated for at least 12,000 RPM.** Grinding Wheels and other accessories running over the rated 12,000 RPM speed can fly apart and cause injury.
8. **When using a hand-held power tool, always maintain a firm grip on the tool with both hands to resist starting torque.**

9. Use **only 4-1/2” diameter Grinding Wheels (not included) having a 5/8” center mounting hole. Never disable or modify the Wheel Guard.**
10. **Avoid unintentional starting.** Make sure you are prepared to begin work before turning on this tool.
11. **Do not force this tool.** This tool will do the work better and safer at the speed and capacity for which it was designed. Do not force the rotating Grinding Wheel (not included) into the object being ground. Apply moderate pressure, allowing the Grinding Wheel to rotate freely without being forced.
12.  **WARNING!** Never install a carbide tipped or steel circular saw blade for use on this tool. Never install a wood carving blade, carving disc with saw chain cutters, or a cutting carving disc on this tool.
13. **For safest operation, it is recommended that only these accessories be used with this tool: Abrasive Cut-Off Discs and Wheels, Flap Wheels, Wire Brushes, Wire Wheel Brushes.**
14. **Never lay this tool down until the Rotating Grinding Wheel has come to a complete stop.** The Rotating Pad can grab the surface and pull the tool out of your control.
15. **Never leave this tool unattended when it is plugged into an electrical outlet.** Turn off the tool, and unplug it from its electrical outlet before leaving.
16. **Always unplug this tool from its electrical outlet before performing inspection, maintenance, or cleaning procedures.**
17.  **WARNING!** Some dust created by power sanding, sawing, grinding, drilling, and other construction activities, contain chemicals known (to the State of California) to cause cancer, birth defects or other reproductive harm. Some examples of these chemicals are: lead from lead-based paints, crystalline silica from bricks and cement or other masonry products, arsenic and chromium from chemically treated lumber. Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals: work in a well ventilated area, and work with approved safety equipment, such as those dust masks that are specially designed to filter out microscopic particles.
(California Health & Safety Code 25249.5, et seq.)
18.  **WARNING!** People with pacemakers should consult their physician(s) before using this product. Operation of electrical equipment in close proximity to a heart pacemaker could cause interference or failure of the pacemaker.

Warning: The warnings, cautions and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that COMMON SENSE AND CAUTION ARE FACTORS WHICH CANNOT BE BUILT INTO THIS PRODUCT, BUT MUST BE SUPPLIED BY THE OPERATOR.

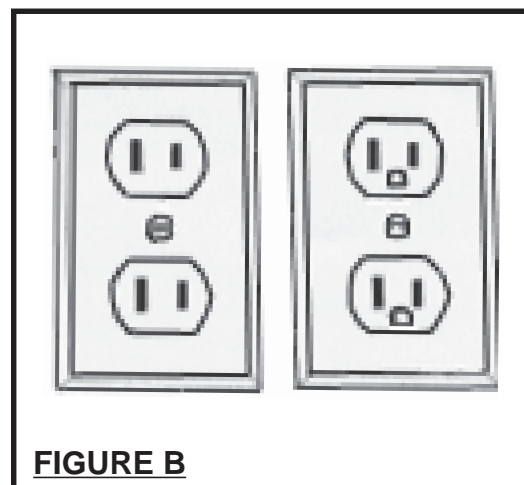
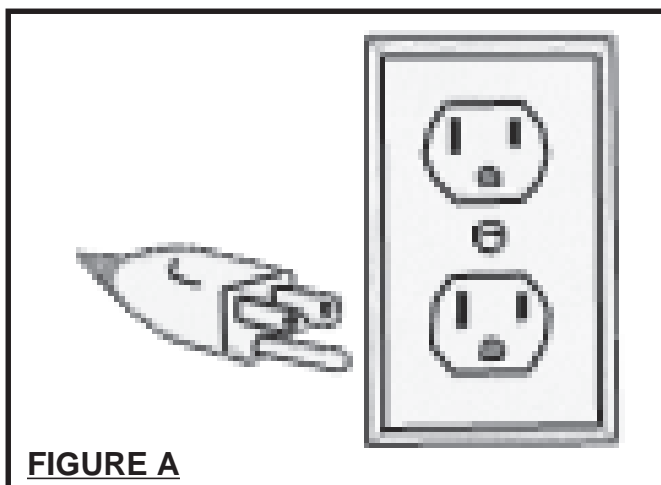
GROUNDING

WARNING!

Improperly connecting the grounding wire can result in the risk of electric shock. Check with a qualified electrician if you are in doubt as to whether the outlet is properly grounded. Do not modify the power cord plug provided with the tool. Never remove the grounding prong from the plug. Do not use the tool if the power cord or plug is damaged. If damaged, have it repaired by a service facility before use. If the plug will not fit the outlet, have a proper outlet installed by a qualified electrician.

GROUNDED TOOLS: TOOLS WITH THREE PRONG PLUGS

1. Tools marked with “Grounding Required” have a three wire cord and three prong grounding plug. The plug must be connected to a properly grounded outlet. If the tool should electrically malfunction or break down, grounding provides a low resistance path to carry electricity away from the user, reducing the risk of electric shock. **(See Figure A, below left.)**
2. The grounding prong in the plug is connected through the green wire inside the cord to the grounding system in the tool. The green wire in the cord must be the only wire connected to the tool’s grounding system and must never be attached to an electrically “live” terminal. **(See Figure A, below left.)**
3. Your tool must be plugged into an appropriate outlet, properly installed and grounded in accordance with all codes and ordinances. The plug and outlet should look like those in the following illustration. **(See Figure A, below left.)**



DOUBLE INSULATED TOOLS: TOOLS WITH TWO PRONG PLUGS

4. Tools marked “Double Insulated” do not require grounding. They have a special double insulation system which satisfies OSHA requirements and complies with the applicable standards of Underwriters Laboratories, Inc., the Canadian Standard Association, and the National Electrical Code. **(See Figure B, above right.)**
5. Double insulated tools may be used in either of the 120 volt outlets shown in the upper right illustration. **(See Figure B, above right.)**




EXTENSION CORDS

1. ***Grounded*** tools require a three wire extension cord.
2. **As the distance from the supply outlet increases, you must use a heavier gauge extension cord.** Using extension cords with inadequately sized wire causes a serious drop in voltage, resulting in loss of power and possible tool damage. **(See Figure C.)**
3. **The smaller the gauge number of the wire, the greater the capacity of the cord.** For example, a 14 gauge cord can carry a higher current than a 16 gauge cord. **(See Figure C.)**
4. **If using more than one extension cord to make up the total length, make sure each cord contains at least the minimum wire size required. (See Figure C.)**
5. **If you are using one extension cord for more than one tool, add the nameplate amperes and use the sum to determine the required minimum cord size. (See Figure C.)**
6. **If you are using an extension cord outdoors, make sure it is marked with the suffix “W-A” (“W” in Canada) to indicate it is acceptable for outdoor use.**
7. **Make sure your extension cord is properly wired and in good electrical condition.** Always replace a damaged extension cord or have it repaired by a qualified electrician before using it.
8. **Protect your extension cords from sharp objects, excessive heat, and damp or wet areas.**

REQUIRED MINIMUM EXTENSION CORD GAUGE - 110 VOLT				
NAMEPLATE AMPERES (At Full Load)	EXTENSION CORD LENGTH			
	0-25 FT.	25-50 FT.	50-100 FT.	100-150 FT.
6	18	16	14	12
8	16	16	12	10
10	16	14	12	10
12	16	14	10	8
14	14	12	10	8
16	14	12	10	8
18	14	12	8	8
20	12	12	8	6
22	12	10	8	6
24	12	10	8	6
26	10	10	8	6
28	10	10	6	4
30	10	10	6	4

FIGURE C

SYMBOLOLOGY

	Double Insulated
	Canadian Standards Association
	Underwriters Laboratories, Inc.
V ~	Volts Alternating Current
A	Amperes
no <u>xxxx</u> /min.	No Load Revolutions per Minute (RPM)

UNPACKING

When unpacking, check to make sure the following parts are included. All sizes listed below are approximate. If any parts are missing or broken, please call Harbor Freight Tools at the number on the cover of this manual. Refer to parts diagram at end of manual.

Item #	Description	Qty.
N/A	Grinder	1
29	Side Handle	1
28	Wrench	1
2	Grinding Wheel	1
N/A	Spare Brushes	2

Warning:

There are certain applications for which this tool was designed. Harbor Freight Tools strongly recommends that this tool not be modified and/or used for any application other than which it was designed.

All accessories must be rated for at least the RPM speed recommended on the tool's warning label.

Wheels and other accessories running over rated speed can fly apart and cause injury.

For safest operation, it is recommended that only these accessories be used with this product:

Abrasive Cut-Off Discs and Wheels

Flap Wheels

Wire Brushes

Wire Wheel Brushes

Always use an approved and proper guard when using the above mentioned accessories. Each accessory must have the correct arbor size and must fit properly on the shoulder bushing. Make sure accessories are tightened down securely.

CAUTION: NEVER INSTALL A CARBIDE TIPPED OR STEEL CIRCULAR SAW BLADE FOR USE ON THIS ANGLE GRINDER. NEVER INSTALL A WOOD CARVING BLADE, CARVING DISC WITH SAW CHAIN CUTTERS, OR A CUTTING CARVING DISC ON THIS ANGLE GRINDER.

Handle

The Grinder comes with a SIDE HANDLE (#29) which can be screwed into either side of the Grinder. (refer to Figure 1.)

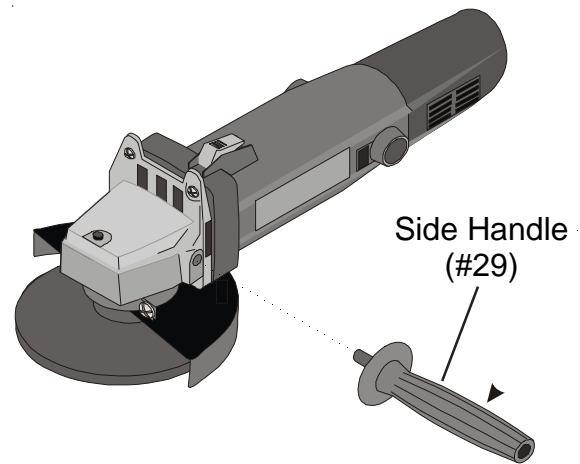


Figure 1 — Attaching Side Handle

Installing Wheels

Warning:

Always disconnect from power source before adding or removing accessories. Use a cloth or glove to protect hands from abrasion.

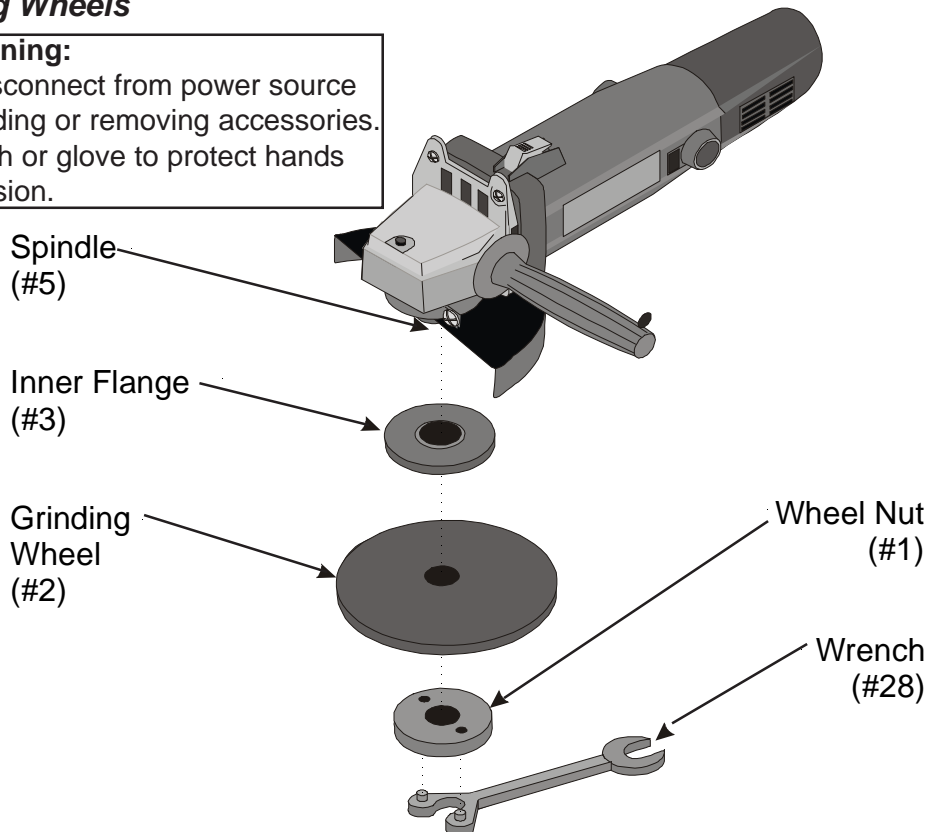


Figure 2 — Installing Wheels

Step 1: Using the WRENCH (#28) (refer to Figure 2), loosen the WHEEL NUT (#1) by turning it counter clockwise.

Step 2: Place the new GRINDING WHEEL (#2) on the SPINDLE (#5) against the INNER FLANGE (#3).

Step 3: By hand, Screw the WHEEL NUT clockwise back onto the SPINDLE, then tighten with the WRENCH.

Removing Wheels

Step 1: Depress the LOCK PIN (#12) and turn the GRINDING WHEEL counterclockwise until the LOCK PIN engages. (See Figure 3).

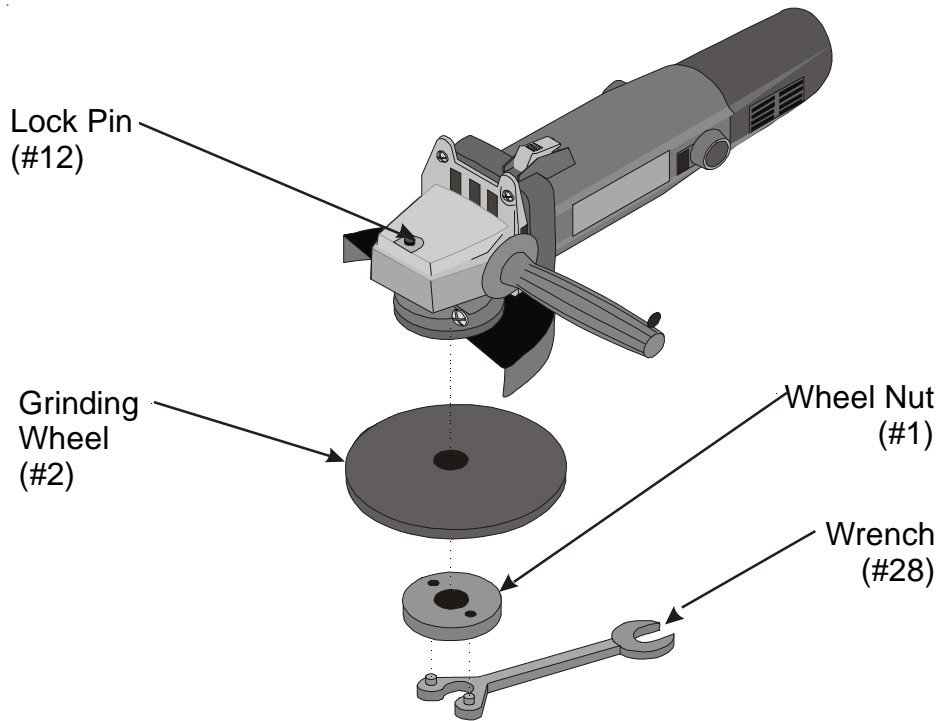


Figure 3 — Removing Wheels

Step 2: Using the WRENCH, loosen the WHEEL NUT by turning it counterclockwise.

Step 3: Unscrew the WHEEL NUT and remove, then remove the GRINDING WHEEL from the SPINDLE.

Starting the Grinder

WARNING:

Ensure the GRINDER is not locked ON before plugging it in. Check the SLIDE SWITCH (#19) and make sure it is in the OFF position before plugging it into the power source.

Step 1: To turn the Grinder ON, push the Slide Switch (#19) forward with your thumb to the front position and the Grinder begins running.

Step 2: To turn the Grinder OFF, move the Slide Switch (#19) backward with your thumb to the rear position until the Grinder stops running.

Slide Switch] (#19)

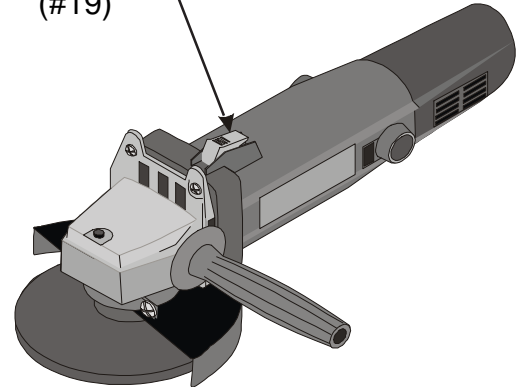


Figure 4-Turning ON the Grinder

Using the Grinder

When using the GRINDING WHEEL, hold the grinder at an angle of 10° to 15° relative to the work surface. When only the outer edge of the GRINDING WHEEL is used, a rough cut surface will result. If the disc is pressed flat against the work, the grinding action will be irregular or bumpy and the tool will be difficult to control.

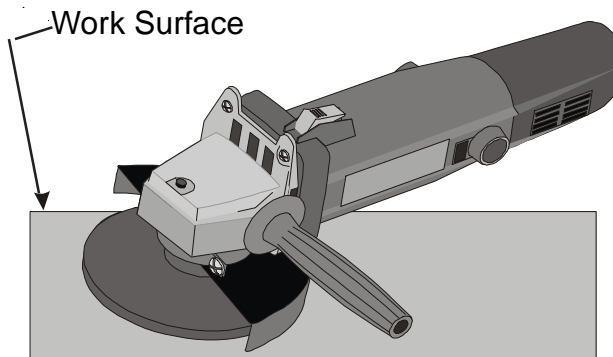


Figure 5 — Angle of Grinder

NOTE:

The HANDLE MUST BE USED AT ALL TIMES to maintain complete control of the tool. Place it on either side where it will afford the best leverage and work visibility.

NOTE:

Motor may heat up with prolonged medium to heavy use. To avoid motor burnout, do not operate beyond a 15 to 20 minute duty cycle when using heavy force.

MAINTENANCE

WARNING:

DO NOT DISASSEMBLE.

This tool should be serviced by a qualified technician only. Incorrect reassembly can result in electric shock, fire, or further damage to the tool.

Always keep the grinder clean

Dust and grit containing particles from metal grinding often accumulate on interior surfaces and could create an electrical shock hazard if not frequently cleaned out. On a regular basis, blow dust and grit out of the motor housing using compressed air. Never blow compressed air at greater than 10 PSI. Always wear goggles and dust mask when using compressed air.

CAUTION:

Never use solvents or other harsh chemicals for cleaning the non-metallic parts of the tool. Use a clean, dry rag only.

Carbon Brush

Replace the carbon brush when it wears down to about 3/16" (5 mm) or sparking will occur.

To change the CARBON BRUSH (#22) do the following:

Step 1: Using a flat tip screw driver, unscrew the BRUSH CAP (# 23) on the HOUSING (# 18).

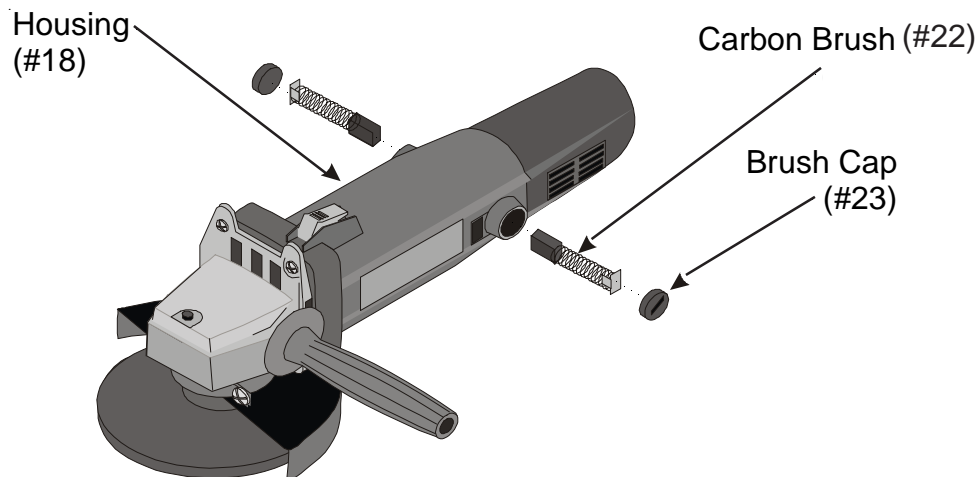


Figure 6 — Replacing the Carbon Brushes

Step 2: Replace the CARBON BRUSH with identical replacement parts from Harbor Freight Tools.

Step 3: Replace the BRUSH CAP on the HOUSING and screw-in to tighten.

PARTS LIST

Item #	Description	Qty
1	Wheel Nut	1
2	Grinding Wheel	1
3	Inner Flange	1
4	Wheel Guard	1
5	Spindle	1
6	Packing Gland	1
7	Ball Bearing	1
8	Gear	1
9	Needle Roller Bearing	1
10	Gear Cover	1
11	Spring	1
12	Lock Pin	1
13	Pinion	1
14	Ball Bearing	1
15	Armature	1

Item #	Description	Qty
16	Ball Bearing	1
17	Stator	1
18	Housing	1
19	Slide Switch	1
20	Slide Bar	1
21	Brush Holder	1
22	Carbon Brush	1
23	Brush Cap	1
24	Cord	1
25	Cover	1
26	Switch	1
27	Switch Holder	1
28	Wrench	1
29	Side Handle	1

PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER NOR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

Assembly Diagram-Exploded View

